

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

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UNITED STATES OF AMERICA, :
: _____
-against- :
: 17-CR-438 (VEC)
EDWIN CORTORREAL, :
: _____
Defendant. : OPINION & ORDER
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VALERIE CAPRONI, United States District Judge:

Edwin Cortorreal is charged with murder in aid of racketeering in connection with a robbery during which the Government alleges Cortorreal shot and killed Kelly Diaz. *See* Superseding Indictment (Dkt. 537). Jury selection and trial is scheduled to commence on April 17, 2023. *See* Order (Dkt. 782). Mr. Cortorreal seeks to exclude DNA evidence collected from a cell phone battery found in the stairwell of the apartment building in which Diaz was killed. *See* Def. Mot. (Dkt. 636); Def. Supp. Mot. (Dkt. 718).¹ Mr. Cortorreal argues that the New York City's Office of the Chief Medical Examiner ("OCME") analyzed the DNA using unreliable methods rendering testimony related to the results of that analysis inadmissible. *See id.* The Government opposes the motion and argues that the DNA collection and analysis satisfy the *Daubert* standard

¹ On August 6, 2021, Defendant moved to preclude testimony regarding DNA collected from a roll of duct tape that was recovered from the victim's apartment. *See* Dkt. 636. On March 18, 2022, Mr. Cortorreal moved to amend his *Daubert* motion to include a motion to preclude testimony regarding DNA collected from the cell phone battery. *See* Dkt. 678. The Court granted Defendant's motion to amend. Dkt. 689.

On July 25, 2022, the Court commenced a four-day *Daubert* hearing and then ordered post-hearing briefing. *See* Dkt. 709. After reviewing the parties' submissions, on November 9, 2022, the Court re-opened the *Daubert* hearing and heard additional testimony on January 9, 2023, and January 19, 2023. *See* Dkts. 740, 753, 757. The focus of that testimony was the method by which OCME determined the number of contributors in the DNA sample collected from the duct tape. *See id.* At the conclusion of the hearing, the Court ordered post-hearing briefing focusing on narrow issues that pertained only to the evidence collected from the duct tape. *See* Dkt. 759. On February 1, 2023, the Government requested to stay all supplemental briefing deadlines to allow for additional testing of the DNA evidence collected from the duct tape. *See* Dkt. 768. The Government subsequently notified the Court and the Defendant that it would no longer seek to introduce DNA evidence collected from the duct tape. *See* Dkt. 774. Accordingly, that portion of Defendant's *Daubert* motion is denied as moot.

for admissibility. *See* Gov. Opp. (Dkt. 644); *see also* Gov. Supp. Opp. (Dkt. 722). For the reasons discussed below, Defendant's motion is DENIED.

BACKGROUND

Mr. Cortorreal moves to preclude testimony regarding the DNA that was collected from the cell phone battery because, he argues, OCME's Low Copy Number ("LCN") testing protocols are unreliable. Def. Supp. Mem. at 1 (Dkt. 718).

I. OCME

New York City's Office of the Chief Medical Examiner ("OCME") is a nationally accredited forensic laboratory that, among other things, performs DNA testing in criminal cases. *See* O'Connor Decl. ¶ 7 (Dkt. 645). OCME is also accredited by New York State's Commission on Forensic Science (the "Commission"). *See* Tr. at 33:11–22 (Dkt. 710). The Commission develops standards for and accredits forensic laboratories in the state. *See id.* OCME is required to adhere to the quality assurance standards and guidelines established by the Scientific Working Group of DNA Analysis Methods ("SWGDAM"), a group run by the Federal Bureau of Investigation ("FBI") that is comprised of approximately 50 scientists from forensic labs in the United States and Canada. *Id.* at 96:22–97:12; *see also* Gov. Opp. at 6 n.5 (Dkt. 644).

II. LCN Testing

DNA analysis involves examining Short Tandem Repeats ("STR"); STRs are small segments of DNA. *See* Krane Decl. ¶ 8 (Dkt. 637-3). DNA analysis looks at the number of times a sequence of bases repeats at a particular location, called a "locus" (or plural, "loci"), in a strand of DNA. *Id.* A person inherits one allele at each locus from each biological parent.² *Id.* For

² Some individuals may be "homozygous," meaning they inherited the same allele from both parents at a particular locus. *See* Tr. at 423:1–12 (Dkt. 714); *see also* Gov. Opp. at 4 n.2 (Dkt. 644).

example, if there are eight consecutive repeats of a sequence of bases at a particular locus, the DNA allele would be called an 8. Continuing the example, if at that same locus, the person also has ten consecutive repeats of a sequence of bases, the “allele call” for that locus would be 8, 10. *See* Tr. at 39:19–41:16 (Dkt. 710). As is relevant to forensic work, the alleles at the different loci comprise a person’s DNA profile; a suspect’s profile can then be compared to the DNA profile recovered from evidence to determine whether the suspect’s DNA matches the DNA recovered from the evidence. *See id.* at 41:25–42:24.

OCME historically has performed two types of DNA testing: High Copy Number (“HCN”) and Low Copy Number (“LCN”). O’Connor Decl. ¶ 10 (Dkt. 645); Gov. Opp. at 6 (Dkt. 644) (citing *United States v. Morgan*, 53 F. Supp. 3d 732, 736 (S.D.N.Y. 2014)).³ Both types of testing involve four steps: (1) extraction (i.e., recovering DNA from human cells); (2) quantitation (i.e., measuring the quantity of DNA extracted); (3) amplification (i.e., copying the DNA multiple times to produce a greater quantity of DNA that can then be analyzed); and (4) analysis. Krane Decl. ¶ 8 (Dkt. 637-3); Gov. Opp. at 4 (Dkt. 644) (citing *United States v. Jones*, 965 F.3d 149, 155 (2d Cir. 2020)).

At the time OCME first performed its analysis on the DNA recovered in this case, OCME had been using LCN testing to analyze samples of DNA ranging from 5 to 100 picograms. *See* Tr. at 99:18–100:11 (Dkt. 710). OCME’s protocols for LCN testing deviated slightly from its protocols for HCN testing. *Id.* 67:12–22, 87:17–88:1. For LCN testing, OCME divided the DNA sample into three aliquots, with each aliquot subject to 31 amplification cycles.⁴ Krane Decl. ¶ 11

³ OCME discontinued LCN testing for new casework in January 2017. Gov. Opp., Ex. B at 68–70 (Dkt. 644-2) (excerpt of *Daubert* hearing transcript in *United States v. Jones*, No. 15-CR-153 (VSB) (Dkt. 427)); *see infra* n. 12.

⁴ By contrast, for HCN testing, DNA is not divided into three aliquots, and the DNA is amplified in only 28 cycles. Krane Decl. ¶ 11 (Dkt. 637-3); *see also* Gov. Opp. at 6–7 (Dkt. 644); Def. Supp. Mem. at 6 (Dkt. 718); Gov. Supp. Opp. at 2–3 (Dkt. 722).

(Dkt. 637-3). After amplification, each aliquot produces a result known as a “replicate” or “triplicate.” *See id.*; Tr. at 84:11–25 (Dkt. 710). The goal of this approach is to account for the increased risk and prevalence of stochastic effects in LCN testing. Tr. at 84:11–25 (Dkt. 710); *see also* Gov. Supp. Opp. at 3 (Dkt. 722).

Both HCN and LCN testing have a risk of stochastic effects, which are random errors in genetic testing. *See* O’Connor Decl. ¶ 10 (Dkt. 645). Because of the small sample size of the source material and the triplicate amplification process, however, LCN testing has an increased risk of stochastic effects, which can make it more difficult to interpret the results of an electropherogram (“EPG”).⁵ *See* Tr. at 75:17–23 (Dkt. 710); Krane Decl. ¶¶ 9–14, 20 (Dkt. 637-3). Stochastic effects include so-called allelic drop-in and drop-out,⁶ and peak height imbalance.⁷ *Id.* LCN testing’s amplification process can also result in elevated or exaggerated stutter, which can be mistaken for a true allele on an EPG. *Id.* ¶¶ 9, 14–15; Tr. at 1058:11–1059:3 (Dkt. 760).

The goal of the triplicate amplification process is to allow analysts to better assess EPGs to account for stochastic effects by examining three EPGs for each locus. Tr. at 77:5–14, 84:11–88:15 (Dkt. 710). The triplicate amplification process increases the likelihood that true alleles will

⁵ An electropherogram, or “EPG,” is a visual representation of DNA fragments that is generated following the amplification process. *See* Tr. at 53:17–54:8 (Dkt. 710). The EPG “looks sort of like mountain peaks where each . . . peak[] represents a different allele at each of the different loci that are tested.” *Id.* at 54:6–11.

⁶ Allelic drop-in can occur when pieces of DNA not actually present in the sample show up in test cycles, likely a byproduct of contamination. Krane Decl. ¶ 14 (Dkt. 637-3); Tr. at 72:2–9 (Dkt. 710). Allelic drop-out can occur when the testing process fails to detect DNA that is actually present in the sample. Tr. at 72:19–73:11 (Dkt. 710). “An allelic drop-out is basically the extreme form of heterozygous peak imbalance, where one allele is preferentially amplified, to the extent that the other allele is not amplified at all or drops out, so it’s not seen. So it’s an allele that should be in the profile that is not seen.” *See* Gov. Opp., Ex. A at 45 (Dkt. 644-1) (excerpt of hearing transcript in *United States v. Morgan*, No. 12-CR-223 (VM) (Dkt. 89)).

⁷ Generally, peak heights should be the same if the allele comes from the same contributor. Tr. at 959:11–23 (Dkt. 760). When the heights of the DNA peaks, which should be roughly the same in each replicate, are significantly different in the various replicates, OCME refers to that result as “peak height imbalance.” *Id.* (“[Y]ou’d expect the peaks of a heterozygous of a locus [of] an individual to be around the same height,” but with LCN, “you could end up with an imbalance of those two peaks which could make it more difficult to discern and match up the two peaks of an individual, number of contributors, mixture ratios, things like that.”).

be seen, which reduces the risk that allelic drop-in or drop-out will have an impact on the analysis.

See id. At a given locus, an allele that appears only once in the three amplifications may be indicative of allelic drop-in or elevated stutter. On the other hand, an allele that appears in two of the three amplifications suggests that its absence in the third is the result of allelic drop-out.

After amplification, DNA analysts examine the results of the EPG to assess whether the sample likely comes from one individual (a single-source sample) or multiple individuals (a mixture). *See id.* at 55:14–56:6 (Dkt. 710). Although analysts have discretion in determining what to call an allele and what to disregard as a stochastic effect, Tr. at 262:22–263:10 (Dkt. 712), OCME’s LCN testing protocols provide that if the sample contains at least three repeating alleles at a minimum of three loci, the sample must be considered a mixture, Gov. Opp. at 9 (Dkt. 644) (citing STR Results Interpretation Protocol at 20–24, 42–43, and 45–48);⁸ *see also* Tr. at 145:17–148:3 (Dkt. 710). After evaluating the results of each amplified replicate, the OCME analyst creates a composite DNA profile based on all alleles that appear in at least two of the three replicates.⁹ Tr. at 88:2–15 (Dkt. 710).

If the analyst determines the sample to be a mixture of two or three contributors,¹⁰ the analyst next determines whether one contributor’s “DNA predominates, such that the analyst can identify a ‘major contributor’” and use that profile for comparison purposes as if it were a single-

⁸ The STR Results Protocols by OCME are updated periodically at https://www1.nyc.gov/assets/ocme/downloads/pdf/technical-manuals/forensicbiology-technical-manuals/str_results_interpreter_idendifiler_and_yfiler_030918.pdf; *see also* GX-22.

⁹ *See* Gov. Opp. at 7 (Dkt. 644); Tr. at 88:2–15 (Dkt. 710) (describing how analysts create a “consensus profile,” which is “a methodology of LCN testing where you take a different number of replicates and look to see how often alleles show up between the replicates,” looking specifically for “which alleles repeated at least twice” to assign those repeating alleles to the composite profile); *see also* Gov. Opp., Ex. C at 251 (Dkt. 644-3) (Caragine, T. *et al.*, “Validation of Testing and Interpretation Protocols for Low Template DNA Samples Using AmpFlister® Identifiler®,” Croatian Med. J., (2009)).

¹⁰ If the analyst determines the sample to be a mixture of more than three contributors, no comparisons are made. *See* Tr. at 842:12–24 (Dkt. 760).

source sample. Gov. Opp. at 9–10 (Dkt. 644) (citing STR Results Interpretation Protocol at 43, 46–47); Tr. at 57:21–59:9 (Dkt. 710). Such a mixture is considered deconvolutable, meaning the analyst can interpret the EPG to discern a distinct DNA profile from the sample. Tr. at 57:2–58:10 (Dkt. 710). If, however, the contributors to a mixture are evenly balanced, then the mixture is deemed non-deconvolutable, meaning no major contributor can be identified. *Id.* at 59:15–60:7. To account for the increased risk of stochastic effects, and purportedly to make its interpretations “more conservative,” OCME will include an allele in the composite profile of a deconvoluted mixture only if the allele appears in all three replicates or if it appears in only two of the three replicates but the major alleles have peak heights within 50% of each other. Gov. Supp. Opp. at 4 (Dkt. 722); Tr. at 166:8–167:8 (Dkt. 710).

In sum: if the analyst is able to deconvolute the mixture to discern a major donor profile, the analyst may then compare that profile to a suspect’s DNA profile to determine whether to include or exclude the suspect as a possible contributor. *See* Tr. at 57:2–58:10 (Dkt. 710).

The conclusions reached by the OCME analyst are subject to second-level review by an assigned technical reviewer. Dr. O’Connor, the Assistant Director of Forensic Biology at OCME, testified that technical reviewers at OCME “rarely” disagree with the initial outcome reached by the analyst. Tr. at 853:1–854:11 (Dkt. 760). He also acknowledged that OCME protocols do not require the technical reviewer to perform a “cold” second-level review — i.e., a review without knowing the conclusion reached by the analyst. *See id.*

III. LCN Validation Studies

To use LCN testing in criminal casework, OCME was required to undergo a validation process and obtain approval from the New York State Commission on Forensic Science. *See* Tr. at 94:22–95:6 (Dkt. 710); O’Connor Decl. ¶ 7 (Dkt. 645). OCME developed its validation studies

based, in part, on peer-reviewed research conducted by other laboratories around the globe that had been studying LCN testing. *See* Gov. Supp. Opp. at 4 (Dkt. 722) (citing GX-9, GX-10, GX-53, GX-54); Tr. at 91:11–94:18 (Dkt. 710). OCME conducted validation studies over the course of a four-year period to test the ability of LCN to analyze DNA samples of different quantities and from different sources reliably. *See* Tr. at 96:2–19 (Dkt. 710). OCME used known samples of both single-source and mixtures in the validation studies. *Id.* at 136:13–24. The validation studies tested a total of approximately 800 different DNA samples, including 100 “touch” samples and samples that involved DNA quantities ranging from 6.25 to 150 picograms. *Id.* at 96:2–19. In total, the validation process took four years and the full-time dedicated work of five to six scientists. *Id.*

OCME compiled its report, which included a 600-page executive summary, and presented its findings to the Commission’s DNA Subcommittee, a group of scientists who advise the Commission on the implementation of scientific controls and quality assurance procedures for conducting forensic DNA analysis. *Id.* at 103:5–104:4. The DNA Subcommittee convened after receiving the validation documents; Subcommittee members and OCME discussed “the interpretational criteria and sensitivity thresholds,” the decision to divide the sample into three aliquots instead of two, and the optimal number of amplification cycles. *See* Gov. Supp. Opp. at 6 (Dkt. 722) (citing GX-63). Ultimately, the DNA Subcommittee approved LCN testing for criminal casework, finding that OCME’s “methodology has merit, that the appropriate validation studies have been completed, and that the assay should be approved for use in the lab.” GX-63 at 4. A new DNA Subcommittee re-assessed and re-approved LCN testing in 2014 and 2017. Tr. at 107:19–23 (Dkt. 710).

Notwithstanding the extensive validation work performed by OCME, OCME remains the only laboratory in the United States to have deployed LCN for use in criminal casework. *Id.* at 94:7–17; Tr. at 543:18–21 (Dkt. 714). Indeed, at least as of August 2014, the FBI did not permit samples analyzed using LCN testing to be entered into the Combined DNA Index System (“CODIS”) based on the FBI’s assessment that LCN testing had not “demonstrated the necessary reliability for use in forensic casework.”¹¹ Silverman Decl., Ex. G at 4 (Dkt. 637-8). In 2017, OCME discontinued its use of LCN testing in favor of newer, more robust amplification kits that are capable of testing the majority of DNA evidence in the LCN range. Tr. at 116:10–117:12 (Dkt. 710).¹²

IV. The DNA Evidence

The DNA evidence at issue includes a swab of DNA collected from a cell phone battery that was found in the stairwell of the victim’s apartment building. Gov. Opp. at 3 (Dkt. 644). The DNA collected from the cell phone battery was first tested in 2007; OCME was able to deconvolute a major donor profile using LCN testing. *See* GX-21 at 058;¹³ Tr. at 58:18–24 (Dkt. 710).

¹¹ CODIS, the Convicted Offender Index of the National DNA Index System, is a database maintained by the FBI’s DNA Casework Unit. *See* Silverman Decl., Ex. G at 4 (Dkt. 637-8). The FBI’s memorandum on “DNA Casework Unit (DCU) Acceptance” states that “LCN[] testing[] is currently being researched by the FBI,” but has not “yet demonstrated the necessary reliability for use in forensic casework by the DCU nor [is it] approved for uploading into” CODIS. *See id.*; *see also* <https://ucr.fbi.gov/lab/biometric-analysis/dna-casework-unit-dcu> (last updated Aug. 12, 2014).

¹² Mr. Cortorreal speculates that OCME decided to discontinue LCN because of criticism and increased controversy surrounding its use. Def. Supp. Mot. at 1, 8 (Dkt. 718). For its part, OCME contends that the reason for the change was largely due to a “cost benefit” analysis after the FBI’s CODIS database raised the minimum number of “core locations” from 13 to 20. *See* Tr. at 116:10–117:23 (Dkt. 710).

¹³ Citations to specific pages in exhibits reflect the last three digits of the corresponding Bates number.

In 2007, the analyst and reviewer of the DNA recovered from the cell phone battery determined that at the D21 locus, the allele call for the major donor was a “30, Z”.¹⁴ Tr. at 306:7–307:21; GX-4 at 291. When another OCME analyst was assigned to the case file in 2015, the analyst re-reviewed the EPG for the DNA recovered from the cell phone battery and changed the allele call for locus D21 from “30, Z” to “30.2, Z”. Def. Supp. Mot. at 17, 22 (Dkt. 718); Gov. Supp. Opp. at 24–25 (Dkt. 722); *see also* Tr. at 306:7–308:8, 323:6–326:11, 410:25–411:22 (Dkt. 712). Dr. O’Connor reviewed the EPGs generated in 2007 and testified that he would have called the allele at D21 a 30.2, not a 30. Tr. at 323:6–326:11 (Dkt. 712).

In 2020, OCME obtained a DNA sample from Mr. Cortorreal, compared the DNA profile from the cell phone battery to Mr. Cortorreal’s DNA profile,¹⁵ and concluded that there was a match. GX-21 at 030. Because the alleles at locus D21 in Mr. Cortorreal’s DNA profile are 29, 30.2, *see* GX-21 at 056, Mr. Cortorreal would have been excluded as a possible contributor when the major donor profile to the cell phone battery was first deduced, because there would have been no DNA match at the D21 locus. Tr. at 309:24–310:22 (Dkt. 712). With the 2015 change to the allele call, however, the DNA collected from the cell battery matched Cortorreal.¹⁶ Gov. Supp.

¹⁴ “Z” represents an allele that is identified at a particular locus as to which the analyst is unable to make an allele call. Tr. at 139:23–140:5 (Dkt. 710); Tr. at 306:24–307:6 (Dkt. 712).

¹⁵ The Government initially asserted that OCME had not received a donor profile from Mr. Cortorreal until 2020. Gov. Supp. Opp. at 24 n.16 (Dkt. 722). Testimony during the *Daubert* hearing revealed that Mr. Cortorreal’s DNA profile had been stored in the State’s DNA Index System since at least 2007. *See* Tr. at 316:16–319:18 (Dkt. 712). The Government has also disclosed that it is possible that Mr. Cortorreal’s DNA profile was available to OCME for comparison in 2015, although the later-assigned analyst and technical reviewer both claim that the change to the allele call occurred prior to seeing Mr. Cortorreal’s DNA profile. *See* Gov. Mot. at 3 (Dkt. 789); Gov. Letter at 2 (Dkt. 797). There is no evidence that the analysts working on this case ever accessed Cortorreal’s profile in the State DNA Index System.

¹⁶ At some point, OCME prepared a “non-conformity report” in which the error in the allele call at D21 was attributed to “inattentiveness by the case analyst and the case reviewer;” the report noted that “careful assessment of the locus should have enabled the analyst and reviewer to assign this allele correctly.” *See* GX 81. The precise timeline of events in terms of when the error was flagged remains unclear. *See* Gov. Mot. at 2–3 (Dkt. 789); Gov. Letter (Dkt. 797). OCME’s position is that the correct allele call for D21 is 30.2, Z; the raw data is available to Defendant if he wishes to challenge the call.

Opp. at 24–25 (Dkt. 722) (citing GX-4 at 237, 285). OCME further concluded that the major donor’s profile would be expected to be found in 1 in 50.4 billion people. GX-21 at 030; Tr. at 142:15–143:1 (Dkt. 710).

DISCUSSION

I. DAUBERT STANDARD

District courts serve as “gatekeepers” for scientific evidence. They are charged with ensuring that the evidence is sufficiently reliable to be presented to the jury. *Daubert v. Merrell Dow*, 509 U.S. 579, 589 (1993); *United States v. Cruz*, 363 F.3d 187, 192 (2d Cir. 2004); *Amorgianos v. Nat'l R.R. Passenger Corp.*, 303 F.3d 256, 265 (2d Cir. 2002). Federal Rule of Evidence 702 “assign[s] to the trial judge the task of ensuring that an expert’s testimony both rests on a reliable foundation and is relevant to the task at hand.”” *Cruz*, 363 F.3d at 192 (quoting *Daubert*, 509 U.S. at 597).

The threshold question for a district court is whether the “proffered expert testimony is relevant.” *Amorgianos*, 303 F.3d at 265. “Next, the district court must determine ‘whether the proffered testimony has a sufficiently reliable foundation to permit it to be considered.’” *Id.* (quoting *Campbell v. Metro. Prop. & Cas. Ins. Co.*, 239 F.3d 179, 184 (2d Cir. 2001)). Among other things, a district court should consider whether (1) the testimony is grounded on sufficient facts or data; (2) the testimony is the product of reliable principles and methods; and (3) the witness has applied the principles and methods reliably to the facts of the case. *See id.* “[I]t is critical that an expert’s analysis be reliable at every step.” *Id.* at 267. District courts may also consider “whether a theory or technique has been or can be tested, whether the theory or technique has been subjected to peer review and publication, the technique’s known or potential rate of error, the existence and maintenance of standards controlling the technique’s operation, and whether the

technique has gained general acceptance in the relevant scientific community.” *United States v. Morgan*, 675 F. App’x 53, 55 (2d Cir. 2017) (cleaned up).

“[E]xpert testimony should be excluded if it is speculative or conjectural, or if it is based on assumptions that are so unrealistic and contradictory as to suggest bad faith or to be in essence an apples and oranges comparison” *Tiffany (NJ) Inc. v. eBay, Inc.*, 576 F. Supp. 2d 457, 459 (S.D.N.Y. 2007) (internal quotation marks omitted) (quoting *Boucher v. United States Suzuki Motor Corp.*, 73 F.3d 18, 21 (2d Cir. 1996)). “[O]ther contentions that the assumptions are unfounded go to the weight, not the admissibility, of the testimony.” *Id.* “A minor flaw in an expert’s reasoning or a slight modification of an otherwise reliable method will not render an expert’s opinion *per se* inadmissible. ‘The judge should only exclude the evidence if the flaw is large enough that the expert lacks good grounds for his or her conclusions.’” *Amorgianos*, 303 F.3d at 267 (quoting *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 746 (3d Cir. 1994)); *see also Morgan*, 675 F. App’x at 55.

II. OCME’S OPINION REGARDING DNA RECOVERED FROM THE CELL PHONE BATTERY IS ADMISSIBLE

Mr. Cortorreal argues that testimony regarding the DNA recovered from the cell phone battery should be excluded because LCN testing is unreliable. *See* Def. Letter-Motion (Dkt. 678); Def. Supp. Mot. at 1 (Dkt. 718). First, Mr. Cortorreal argues that, because OCME is the only crime lab in the United States to use LCN for criminal case work, LCN lacks general acceptance in the scientific community. Def. Supp. Mot. at 20 (Dkt. 718). Mr. Cortorreal also attacks the sufficiency of OCME’s validation of LCN because OCME’s validation studies: tested as few as seven mock case work samples, only two of which were in the range in which LCN would be used, and did not validate LCN for three or more contributors or for degraded mixtures. *Id.* at 20–21. Mr. Cortorreal further argues that OCME’s LCN protocols are deficient because they “remove

contamination safeguards” and were not subjected to “rigorous” peer-review. *Id.* at 21–22.

Finally, Mr. Cortorreal argues that interpreting EPGs for low copy DNA is exceedingly difficult due to the need for analysts to distinguish between true alleles and stochastic effects, rendering the analysis unreliable, as evidenced by the allele-call change that was made at the D21 locus. *Id.* at 17, 22. Simply put: the “flexibility in interpreting LCN data,” Mr. Cortorreal asserts, “makes the technology unreliable and dangerous.” *Id.* at 22.

Most courts to have considered the issue, including some in this district, have admitted testimony regarding DNA analyzed using OCME’s LCN process in the face of similar *Daubert* challenges.¹⁷ Mindful of the impact DNA evidence can have when presented to a jury, as well as the Court’s critical gatekeeping role, this Court conducted a painstaking, in-depth *Daubert* hearing, during which six witnesses testified over the course of six days. The witnesses were subject to thorough cross-examination, and the Court prodded for more data and evidence, prompting an additional two rounds of briefing by the parties. After a careful review of the record, the Court finds that the Government has met its burden to establish that the LCN testing performed on the DNA recovered from the cell phone battery meets the reliability standard set forth in *Daubert* and Rule 702.

A. General Acceptance in the Scientific Community

First, Mr. Cortorreal argues that LCN testing is not generally accepted by the relevant scientific community because OCME is the only lab in the United States to have used LCN in criminal case work, weighing against admissibility. *See* Def. Supp. Mot. at 20 (Dkt. 718).

¹⁷ See, e.g., *United States v. Wilbern*, 2019 WL 5204829 (W.D.N.Y. Oct. 16, 2019), *aff’d*, 2022 WL 10225144 (2d Cir. 2022); *United States v. Morgan*, 53 F. Supp. 3d 372 (S.D.N.Y. 2014), *aff’d*, 675 F. App’x 53 (2d Cir. 2017); but see *United States v. McCluskey*, 954 F. Supp. 2d 1224, 1279–80 (D.N.M. 2013) (finding LCN testing inadmissible “as performed by the NMDPS Lab,” in contrast with New York cases that found LCN testing admissible based on OCME’s “different procedures and interpretive methods,” including that OCME “has done extensive internal validation of its LCN testing and has received certification and approval for it”).

Although other labs across the world have used LCN testing in criminal cases, including in the United Kingdom, Netherlands, and New Zealand, Gov. Supp. Opp. at 24 (Dkt. 722), according to the Defendant, those labs have either disbanded, ceased using LCN, or have deviated from the protocols used by OCME, *see* Def. Supp. Opp. at 20 (Dkt. 718); *see also* Tr. at 544:4–545:25 (Dkt. 714). Mr. Cortorreal also argues that the FBI’s decision not to accept DNA profiles derived from LCN testing into CODIS demonstrates that the testing is not generally accepted in the scientific community. Def. Supp. Mot. at 5, 20 (Dkt. 718). Indeed, some scientists in the relevant community have openly criticized OCME’s decision to use LCN in criminal case work. Among the critics of LCN is Dr. Angela van Daal, an expert in molecular biology with extensive experience in LCN testing and forensic DNA analysis; Dr. van Daal testified during the *Daubert* hearing and was critical of LCN. *See id.* at 4; *see also* Tr. at 490:5–493:15, 501:23–25 (Dkt. 714).

The fact that OCME is the only crime lab in the United States to have used LCN testing for criminal case work is somewhat less damaging to the Government’s position than it first appears when it is known that several states have outsourced their LCN testing to OCME — OCME has performed LCN testing for 10 states and the FBI, including for post-conviction cases. Tr. at 114:13–24 (Dkt. 710). LCN has also been used to identify human remains in missing persons cases and for other purposes in the medical field. *See id.* at 91:20–25; Tr. at 576:11–577:23 (Dkt. 714). Moreover, the DNA Subcommittee, which is comprised of highly regarded molecular biologists and population geneticists, has repeatedly found LCN testing to have “scientific merit” and approved its use in criminal case work. *See* Tr. at 589:24–592:22 (Dkt. 714). Thus, the Court finds that LCN has been accepted in the relevant scientific community, including for use in criminal case work. Reasonable minds may differ, but criticisms of whether LCN testing is appropriate for criminal case work go to the weight of the evidence, not its admissibility. *See In re*

Fosamax Prods. Liab. Litig., 645 F. Supp. 2d 164, 173 (S.D.N.Y. 2009) (“If an expert’s testimony lies within the range where experts might reasonably differ,” it is the trier-of-fact who “should decide among the conflicting views of different experts.”) (cleaned up).

B. LCN Validation Studies

Mr. Cortorreal also challenges the sufficiency of the validation studies done with respect to LCN testing. OCME’s LCN testing protocols underwent a four-year validation process testing approximately 800 different samples, comprising more than 100 touch samples and samples with DNA quantities ranging from 6.25 to 150 picograms. *See* Tr. at 96:2–19 (Dkt. 710). The Government asserts that the validation studies confirmed the ability of LCN testing to reliably detect and produce a DNA profile from low copy DNA. Gov. Supp. Opp. at 17–18 (Dkt. 722).

Mr. Cortorreal argues, however, that the validation studies for mixtures “only tested two-person mixtures from pristine samples,” Def. Supp. Mot. at 21 (Dkt. 718), whereas crime scene samples are overwhelmingly degraded mixtures, often with more than two contributors, Tr. at 526:1–19 (Dkt. 714). In the validation study, OCME tested only seven mock case work mixtures and only two of the seven contained the quantity of DNA that would call for LCN testing pursuant to OCME protocols. *See id.* at 528:21–529:7. Accordingly, Mr. Cortorreal argues that OCME “did not validate LCN for use on crime scene samples” because it only tested two mixture samples in the LCN range. Def. Supp. Mot. at 21 (Dkt. 718).

Daubert, however, does not require absolute certainty, nor does it require “that every conceivable application of a scientific methodology be tested.” *See Morgan*, 53 F. Supp. 3d at 741. OCME did, in fact, perform validation studies on mixtures and non-pristine samples, pursuant to SWGDAM’s recommendations. Tr. at 96:22–98:4 (Dkt. 710). While Mr. Cortorreal’s criticisms of the sufficiency of OCME’s LCN validation studies relative to non-pristine, mock

casework mixtures are not outlandish, those criticisms go to weight, not admissibility: Rule 702 contemplates that the jury can decide “which of two conflicting experts’ testimony to credit, and how much weight to give the evidence it accepts.” *Morgan*, 53 F. Supp. 3d at 743. In short, the Court finds that OCME’s LCN methodology was sufficiently tested and validated.

C. OCME’s LCN Protocols Meet Industry Standards

Mr. Cortorreal also disputes the reliability of OCME’s LCN protocols but largely on grounds that have already been addressed above or that are inapplicable to expert testimony regarding the DNA recovered from the cell phone battery.¹⁸ *See* Def. Supp. Mot. at 21 (Dkt. 718) (criticizing OCME’s protocols for estimating the number of contributors and the sufficiency of the LCN validation studies). Mr. Cortorreal further argues that OCME removes contamination safeguards by permitting amplification of samples despite evidence of possible contamination. *See id.* at 8, 21. As it pertains to the cell phone sample, the Court finds Cortorreal’s criticisms all go to the weight of the evidence, not its admissibility.

Because of the small quantity of DNA used for LCN testing, OCME “used a wholly separate lab for LCN testing, which was subject to enhanced sanitation safeguards, including additional equipment and cleaning.” Gov. Supp. Opp. at 4 (Dkt. 722); Tr. at 73:22–74:16 (Dkt. 710). OCME’s LCN protocols were subjected to multiple rounds of review by the DNA Subcommittee and were ultimately deemed appropriate. As noted in *Morgan*, the fact that “the DNA Subcommittee asked for more time to review the data, additional experiments, and more

¹⁸ Mr. Cortorreal’s argument that OCME’s LCN protocols are deficient because they “undercount four-person mixtures,” Def. Supp. Mot. at 21 (Dkt. 718), is inapplicable to mixtures that are deconvolutable, like the DNA recovered from the cell phone battery. Although the Court remains troubled by certain aspects of OCME’s methodology for determining the number of contributors to non-deconvolutable mixtures, those concerns are not implicated here because OCME was able to deduce a major donor profile from the cell phone battery swab. *See* Gov. Supp. Opp. at 22 n.13 (Dkt. 722). Because the Government has decided not to offer DNA evidence recovered from the duct tape sample, which was not a deconvolutable mixture, this Opinion & Order does not address the admissibility of such evidence.

documentation prior to granting its approval shows that the Subcommittee had and used opportunities for critical evaluation.” 53 F. Supp. 3d at 742. Further, the fact that the protocols allow OCME to proceed to the amplification process notwithstanding potential contamination is understandable in light of the fact that allelic drop-in can be an explanation for spurious alleles appearing in a negative control, and the procedures have been validated to account for that stochastic effect. Tr. at 288:20–290:2 (Dkt. 712).

The Court does, however, find it troubling that OCME protocols do not expressly call for a blind review of the initial analyst’s conclusion. Much of the work that the OCME analyst performs when conducting LCN testing requires the analyst to exercise discretion, professional judgment, and expertise. *See* Tr. at 880:4–881:23 (Dkt. 760). While that characteristic of the LCN testing protocol is not fatal to its admissibility, particularly when dealing with a deconvoluted sample, the fact that the technical reviewer can easily access the conclusion reached by the analyst before the second-level review is conducted raises concerns that the review is not meaningfully independent. *See id.* at 851:19–852:25. That concern is enhanced by Dr. O’Connor’s testimony that technical reviewers at OCME “rarely” disagree with the conclusion reached by the analyst. *See id.* at 853:1–9.¹⁹ But those concerns, if shared by the defense, can be put before the jury for it to determine what weight the evidence deserves. *Cf. Mahone v. United States*, 2008 WL 504012, *4 (D.Me. Feb. 20, 2008) (*Daubert* challenge of expert’s failure to conduct a blind review of fingerprint analysis went to weight, not admissibility).

On balance, the Court finds that the Government has demonstrated that opinions rendered based on OCME’s LCN protocols pass the *Daubert* threshold for admissibility.

¹⁹ The failure of both the analyst and the technical reviewer in 2007 to catch the erroneous allele call at the D21 locus illustrates how a second-level review has little value if the reviewer is not “blind” to the initial conclusion. If the second-level review were truly independent, perhaps the error would have been caught at that time.

D. Peer Review

Mr. Cortorreal argues that OCME’s peer-reviewed article summarizing its LCN validation studies, which was published in the Croatian Journal of Medicine, was accepted for publication too quickly for there to have been a rigorous review process. *See* Def. Supp. Mot. at 21–22 (Dkt. 718). Dr. Angela van Daal testified, however, that although the peer-review process is “usually a lengthy procedure,” “[s]ome journals have a more rapid turn-around.” Tr. at 523:1–524:6 (Dkt. 714). In any event, as the Government correctly points out, other courts have found LCN to have been “sufficiently peer-reviewed for *Daubert* purposes.” Gov. Supp. Opp. at 20 (Dkt. 722); *Morgan*, 53 F. Supp. 3d at 742 (“OCME’s LCN validations also withstood the scrutiny of peer review in a scientific journal, strong evidence of the general acceptance of OCME’s specific LCN testing methodologies in the scientific community.”), *aff’d*, 675 F. App’x 53 (2d Cir. 2017).

This Court agrees with those courts; the LCN protocols are based on reliable methods that have been adequately tested and peer-reviewed.

E. Other Factors, Including the Allele-Call Change

Finally, Mr. Cortorreal argues that other factors counsel against admitting testimony regarding the DNA recovered from the cell phone battery. Specifically, Mr. Cortorreal argues that the increased risk of contamination and degradation of crime scene samples, including the heightened occurrence of stochastic effects in LCN testing, call into question LCN’s reliability, particularly for criminal case work. *See* Def. Supp. Mot. at 22 (Dkt. 718). As evidenced by the initial analyst’s mistaken allele call at the D21 locus, EPGs for low copy DNA can be difficult to interpret and require the analyst to discern whether an allele is a true allele or simply an artifact. *See id.*; *see also* Tr. at 471:21–472:20 (Dkt. 714) (Dr. Krane testifying that “it’s a very real possibility that with a low copy number approach and a low amount of template,” an allele may be

just as likely to appear in only one replicate because it is “stutter or drop-in,” or because “it failed to be detected in the other two runs”).

Mr. Cortorreal further argues that the Government has inconsistently described the first analyst’s error — whether a typographical error or human error — and that OCME changed the allele call to 30.2 allegedly on the same day it learned the identities of the suspects in this case. Def. Supp. Reply at 28 (Dkt. 727). According to Mr. Cortorreal, the analyst who reviewed the case file in 2015 changed the allele call at the D21 locus from 30 to 30.2 only after having compared the major donor profile from the cell phone battery to Mr. Cortorreal’s DNA profile,²⁰ and then described the error as insignificant because it “did not impact the fact that” the major donor profile deduced from the cell phone battery “matches a listed suspect in the case.” *Id.* (citing GX-81). Mr. Cortorreal points to this as evidence suggesting, at worst, “a lab that is trying to create proof for a District Attorney’s office rather than conduct objective and unbiased science,” *id.* at 28–29, and, at best, that OCME “has limited confidence in the DNA profile that its analysts create using LCN” given that it “did not wait even one day before altering the evidence donor’s deduced genotype to match the suspect that NYPD provided,” *id.* at 30.

Dr. O’Connor methodically described on cross-examination, how, without considering Mr. Cortorreal’s DNA profile, the EPG for the DNA collected from the cell phone battery revealed a 30.2 at the D21 locus, not a 30, suggesting that the first analyst made a typographical error. Tr. at

²⁰ Significantly, Mr. Cortorreal has presented no evidence to support the allegation that OCME changed the allele call after it learned that Mr. Cortorreal was a suspect. According to the Government, at or around the time the allele call was corrected, the police asked OCME to compare the DNA evidence collected in connection with the Diaz homicide to suspects from “Citywide Pattern 14 (Pharmacies).” Gov. Mot. (Dkt. 789). The Court has not seen any evidence that the analyst who changed the allele call viewed the DNA evidence associated with that pattern of burglaries or that Cortorreal was even among those associated with that pattern at that time.

323:2–324:20 (Dkt. 712).²¹ Whether the analyst made the correction on the same day she was asked to compare the DNA collected in connection with the Diaz murder to suspects from “Citywide Pattern 14 (Pharmacies)” is less relevant considering Dr. O’Connor’s persuasive testimony that the proper allele call for D21 was 30.2.²² The OCME analyst’s reaction to learning that the change to the allele call at the D21 locus resulted in a likely match to a suspect’s DNA is unknown, despite the Defendant’s speculation that the analyst was “comforted” by that fact. *See* Feb. 28, 2023 Hearing Tr. at 18–20 (Dkt. 779); *see also* Def. Opp. at 16 (Dkt. 791). Having reviewed the evidence for itself and having probed Dr. O’Connor’s opinion independent of the parties’ examinations, the Court is persuaded that the timing of the allele-call change does not render the evidence unreliable. The basis for the analysts’ change to the allele call at D21 is a legitimate subject for cross-examination at trial but is insufficient to bring the reliability of the evidence into question for *Daubert* purposes. Mr. Cortorreal’s concerns about the difficulty in interpreting EPGs in LCN do not render testimony about the EPGs generated from the cell phone battery DNA inadmissible, particularly where, as here, OCME was able to deconvolute the DNA and deduce a major donor profile.

The Court shares some of Mr. Cortorreal’s concerns, including those concerns voiced by other courts: namely, that LCN testing increases the risk of scientific and, by extension, analytical

²¹ Dr. O’Connor specifically testified using the EPG and describing how, in each run, a 30.2 allele was seen at the D21 locus and was the highest peak at that locus. Tr. at 324:5–20 (Dkt. 712); *see also* GX-4.

²² For its part, the Government now asserts that the precise date on which OCME detected the allele-call error is uncertain, but that, in all events, OCME changed the allele call before reviewing Mr. Cortorreal’s DNA profile. *See* Gov. Mot (Dkt. 789).

error; and that OCME’s LCN validation studies largely focused on pristine, two-person mixtures.²³ But this Court joins the chorus of the overwhelming majority of courts that have considered this issue — concerns over the reliability of opinions based on LCN testing of a deconvolutable DNA sample go to weight, not admissibility. *See United States v. Wilbern*, 2022 WL 10225144, *2 (2d Cir. Oct. 18, 2022) (affirming district court’s decision to admit LCN DNA evidence, finding that the defendant’s “argument that the district court disregarded evidence of contamination and irregularities in the DNA profiles goes to the weight of the evidence, not its admissibility”) (summary order).

The Court thus finds that the Government has demonstrated that Mr. Cortorreal’s criticisms of LCN testing when a major contributor can be determined go to the weight, and not the admissibility, of expert testimony regarding DNA recovered from the cell phone battery.

III. CONCLUSION

For the foregoing reasons, Mr. Cortorreal’s *Daubert* motion is DENIED. The parties are reminded that jury selection and trial will take place on **April 17, 2023 at 10:00 a.m.** in Courtroom 443 of the Thurgood Marshall Courthouse, 40 Foley Square, New York, New York, 10007.

SO ORDERED.

Date: April 7, 2023
New York, New York


VALERIE CAPRONI
United States District Judge

²³ *See, e.g., New Jersey v. Rochat*, 269 A.3d 1177 (N.J. App. Div. 2022). *Rochat* rejected LCN testing under the more stringent *Frye* standard, which asks whether the government “clearly established” that the technique “is widely, but perhaps not unanimously, accepted as reliable by the relevant scientific community.” *See id.* at 1202–03. By contrast, the *Daubert* standard merely requires a showing that the expert’s testimony “rests on a reliable foundation and is relevant to the task at hand.” *Morgan*, 675 F. App’x at 55; *cf. MBIA Ins. Corp. v. Patriarch Partners VIII, LLC*, 2012 WL 2568972, at *15 (S.D.N.Y. July 3, 2012) (*Daubert* and the Federal Rules of Evidence “favor the admissibility of expert testimony and are applied with a liberal thrust”) (citation omitted).